

**CLAIMS**

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1. Process for the catalytic polymerization of olefins, wherein olefins are contacted with a particulate catalyst in a fluidized bed and in a moving bed such that the residence time in the fluidized bed and the residence time in the moving bed are independently controlled.

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2. Process according to claim 1, wherein the residence time in the moving bed is independently controlled.

3. Process according to claim 1 or 2, wherein the residence time in the moving bed is controlled by controlling the outflow rate of particles from the moving bed.

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4. Process according to claim 1-3, wherein the moving bed is separated from the fluidized bed by a separation fluidum.

5. Process according to claim 4, wherein the separation fluidum is supplied to the moving bed.

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6. Process according to claim 4 or 5, wherein the separation fluidum is a gas or a liquid and selected from the group comprising an inert gas or liquid, such as nitrogen, C<sub>1</sub>-C<sub>12</sub>-alkane or olefins such as C<sub>1</sub>-C<sub>12</sub>-alkylene, or mixtures thereof.

7. Process according to claim 6, wherein the separation fluidum is a liquid evaporating under the residing polymerization conditions.

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8. Process according to claim 5-7, wherein liquid olefins are added as separation fluidum such that the polymerization in the moving bed is a condensed mode polymerization.

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9. Process according to claim 1-8, wherein liquid olefins are added to the fluidized bed such that the polymerization in the fluidized bed is in a condensed mode polymerization.

10. Process according to claim 4-9, wherein the separation fluidum is a polymerization monomer or comonomer, or mixtures thereof.

11. Reactor system comprising a fluidized bed reactor provided with a reactant inlet, a product outlet and means for maintaining a fluidized bed in the fluidized bed reactor and with a moving bed reactor provided with an inlet directly connected to the fluidized bed reactor and an outlet connected to the fluidized bed reactor such that the residence time in the fluidized bed reactor and the residence in the moving bed reactor are independently controlled.

12. Reactor system according to claim 11, wherein the inlet of the moving bed reactor is arranged in the fluidized bed reactor.

10 13. Reactor system according to claim 11 or 12, wherein the outlet of the moving bed reactor is connected to the fluidized bed reactor.

14. Reactor system according to claim 11-13, wherein the moving bed is arranged in, around or adjacent to the fluidized bed reactor.

15 15. Reactor system according to claim 11-14, wherein the moving bed reactor is provided with means for supplying a separation fluidum.

16. Reactor system according to claim 11-15, wherein the separation fluidum is a gas or liquid and selected from the group comprising an inert gas or liquid, such as nitrogen and C<sub>1</sub>-C<sub>12</sub>-alkane, or olefins such as C<sub>1</sub>-C<sub>12</sub>-alkylene.

20 17. Reactor system according to claim 11-16, wherein the inlet of the moving bed reactor is provided with a diverging section.

18. Reactor system according to claim 15-17, wherein the outlet of the moving bed reactor is provided with means for controlling the outflow rate of particles from the moving bed.

25 19. Use of a reactor according to claim 17-19 for the catalytic polymerization of olefins.